

REMARKS/ARGUMENTS

Information Disclosure Statement

In the aforementioned Office Action, the Examiner states that the IDS filed 4/2/09 appears to have errors in two document numbers. The applicant respectfully notes that the documents identified by the Examiner as containing errors do not contain such. Copies of these documents are attached to this response, for reference. It is noted that the documents listed as "2001/030630" and "2002/148032" are also identified as "2001/0030630" and "2002/0148032", respectively. Omitting such leading zeros is common practice in identifying application numbers. The publication dates and names of applicants are correct as listed in the IDS.

Amendments to the Specification

Paragraph [0003] of the specification has been amended to more clearly define the test standards referred to therein.

Amendments to the Claims

This Amendment and Reply is intended to be completely responsive to the Office Action mailed June 10, 2009. Applicant respectfully requests reconsideration of the present Application in view of the foregoing amendments and in view of the reasons that follow. Claims 1-151 were previously canceled without prejudice to further prosecution on the merits. Claims 152, 157-162, 165-167 and 170 are currently amended. No new matter has been added. Accordingly, Claims 152-173 will remain pending in the present Application upon entry of this Amendment and Reply.

Claim Rejections - 35 USC § 112

The Examiner has rejected claims 152-173 under 35 USC § 112, second paragraph, as being indefinite. Specifically, the Examiner contends that use of the term "high" tensile strength fabric is indefinite. Applicant submits that the term high tensile strength would be known to one skilled in the art in the context of this application; however, applicant has amended the claims to replace the term "high tensile strength fabric" with "fragment resistant fabric." It is submitted that the term fragment resistant fabric is well known in the art and does not include relative terms. Such fragment resistant fabrics include those which are ballistic resistant as described in the specification.

The Examiner has further rejected claim 165 for claiming a test standard that is not defined. The applicant respectfully disagrees with the Examiner. Test standards are routinely found in claims and it is submitted that the standards as stated, "MIL-STD-662F" and "MIL-P-46593A" are properly defined. It is well known that the designation letter following the standards indicates a revision number and provides a proper basis for ascertaining the appropriate date at which the standard is read. Furthermore, applicant submits that the standards are fully described, at least at paragraphs [0003] and [0004], of the specification. Notwithstanding the above, applicant has amended paragraph [0003] of the specification to more fully identify the standard, including providing a proper citation for the year published. It is submitted that in view of the above, the test standards in the claims are fully defined and easily identified by one skilled in the art.

The Examiner has also rejected claims 171 and 173 for referring to "said movable member" without proper antecedent basis. In response, applicant has amended claim 170, from which claims 171 and 173 depend, to include the statement "and wherein said lock further comprises a movable member coupled to said depressible member, and said shell includes receiving means for receiving said moveable member." Thus, proper antecedent basis is provided for "said movable member" in claims 171 and 173.

In view of the above, applicant submits that all rejections under 35 USC § 112 are no longer applicable and as such, requests the removal of these claim rejections.

Claim Rejections - 35 USC § 102

In the aforementioned Office action, the Examiner rejected, *inter alia*, Claims 152-155, 157, 158-164, and 158-172 under 35 USC § 102 as being anticipated by Aileo (US 4,847,920). For the reasons set forth below, applicant respectfully disagrees.

Aileo is directed at a dual-visor assembly for a helmet having an inner visor releasable secured to the helmet and an outer visor releasable secured to the helmet over the inner visor. The Examiner argues that Aileo teaches "a visor 18 comprising a first layer of transparent material 18 and a helmet shell 12 comprising fiberglass fabric connected to the first layer of the visor 18 with part of the fabric from the shell covering the inside portion of the visor. The part is located outside the viewing area of the visor 18."

The Examiner appears to be misconstruing the claims of the present application which require that the visor comprises a plurality of layers of fragment resistant fabric

connected to a first layer of transparent material. Furthermore, the Examiner appears to be reading teachings into Aileo in view of the claims of the present invention, where such teachings differ significantly.

Specifically, Aileo teaches a helmet shell 12 formed of fiberglass fabric molded with epoxy resin (column 2, lines 35-37), and wherein the helmet shell 12 is in contact with a visor 18. These are substantially different structures. There is no teaching in Aileo that the visor comprises a first layer of transparent material and a plurality of layers of high tensile strength fabric connected to the first layer of transparent material. Furthermore, there is no teaching in Aileo that any fabric is connected to the transparent visor portion and covering a part of the visor portion. The only mention of the materials used to form the visor in Aileo occurs at column 2, lines 52-55, "...includes a transparent lens portion 20 formed of any suitable plastic material, preferably polycarbonate." There is no plurality of layers of materials in the visor of Aileo, as required by claim 1 of the present application.

The fabric, as used only in the helmet portion of Aileo does not provide any enhancement to the resistance to shattering of the visor as would be provided by the present invention. The use of fabrics, including fiberglass fabrics, molded with epoxy resin is a common material used in the formation of helmet shells. An example of such is disclosed in paragraph [0093] of the present application as well. The Examiner appears to be arguing that part of the fabric from the shell covers the inside portion of the visor. This is not, however, what the present claims are directed towards.

Claim 152 explicitly requires a visor comprising a first layer of transparent material, and a plurality of layers of fragment resistant fabric connected to said first layer and covering part of said first layer, said part being limited to an area which is positioned outside a region of said first layer which forms a transparent viewing area of said visor. There is no such visor disclosed in Aileo.

The invention as presently defined in the claims includes the benefit that the plurality of layers of fragment resistant fabric serves to reinforce the transparent portion of the visor and provides additional safety and protection in the event objects or, fragments of objects, impact the visor portion of the helmet. This specifically works to prevent penetration to a wearer of sharp, high energy fragments.

In summary, applicant respectfully submits that Aileo fails to disclose, or suggest, the visor construction according to claim 152 for at least, failing to teach a visor formed of a first transparent layer and a plurality of layers of fragment resistant fabric. Such construction is markedly different from Aileo where the helmet is said to include a fibreglass fabric and potentially contacts the visor at an interface thereof.

In view of the above, applicant submits that claim 152 is novel and that claims 153-155, 157, 158-164, and 158-172, which depend therefrom are also novel and unobvious over the prior art.

Claim Rejections - 35 USC § 103

In view of the above remarks and arguments, it is submitted that the rejections to claims

156, 158 and 165 no longer apply.

Closing Remarks

Applicant respectfully submits that each and every pending rejection and objection has been overcome, and that the present Application is in a condition for allowance. In particular, even when the elements of Applicants' claims are given a broad construction and interpreted to cover equivalents, the references of record do not teach, disclose, or suggest the claimed subject matter. Favorable reconsideration of the Application is respectfully requested.

Further, Applicant respectfully puts the Patent Office and all others on notice that all arguments, representations, and/or amendments contained herein are only applicable to the present Application and should not be considered when evaluating any other patent or patent application including any patents or patent applications which claim priority to this patent application and/or any patents or patent applications to which priority is claimed by this patent application.

In view of the above amendments and remarks, it is believed that this amendment is in condition for submission and, accordingly, the application is now in condition for allowance, and a Notice thereof is respectfully requested. Should the Examiner have any questions or wish to discuss this matter further, or be of the opinion that a telephone interview would expedite prosecution of the subject application, please contact the undersigned at the telephone number provided below.

The Commissioner is hereby authorized to charge any additional fee which may be required for this application under 37 C.F.R. §§ 1.16-1.18, including but not limited to the issue fee, or credit any overpayment, to Deposit Account No. 50-4035.

Should no proper amount be enclosed herewith, as by a check being in the wrong amount, unsigned, post-dated, otherwise improper or informal, or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 50-4035.

Respectfully submitted

Date: SEPT 10/2009



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Encl.
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(19) **United States**(12) **Patent Application Publication** (10) Pub. No.: **US 2001/0030630 A1****Junk**(43) Pub. Date: **Oct. 18, 2001**(54) **PORTABLE MACHINE DISPLAY**(30) **Foreign Application Priority Data**(75) Inventor: **Paul B. Junk, Neuwied (DE)**

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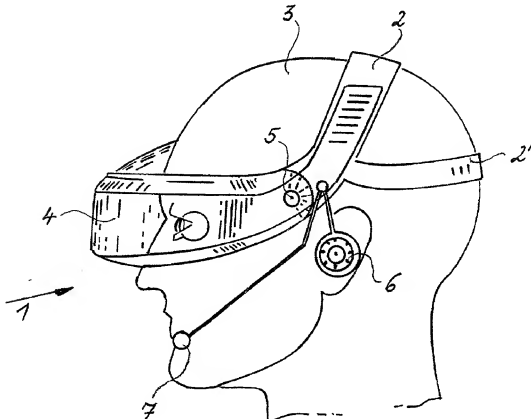
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(52) U.S. CL 345/7

(73) Assignee: **Winkler & Dunnebier Aktiengesellschaft**(57) **ABSTRACT**(21) Appl. No.: **09/833,509**

A portable terminal for displaying the operating values of a machine. The display of the monitor is in the form of goggles. The goggle lenses display the operating values of the machine while simultaneously allowing the environment to be viewed.

(22) Filed: **Apr. 12, 2001**

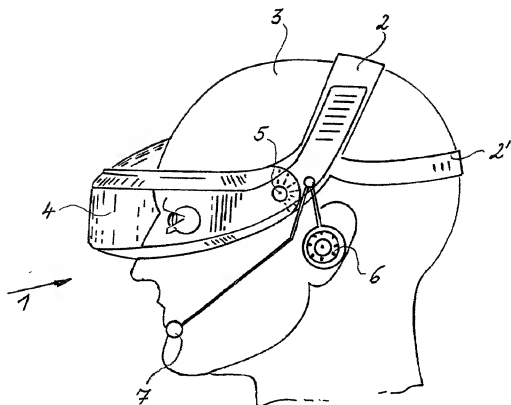


FIG. 1

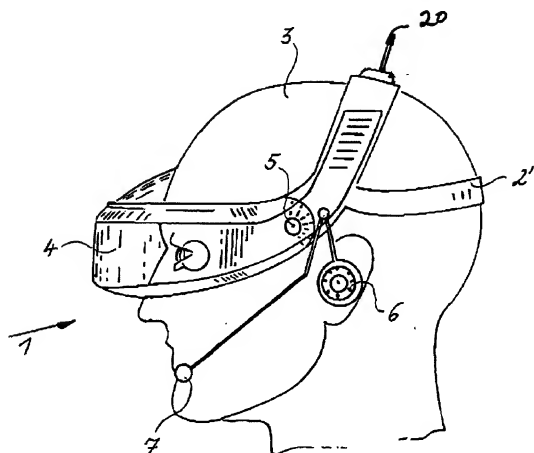


FIG. 2

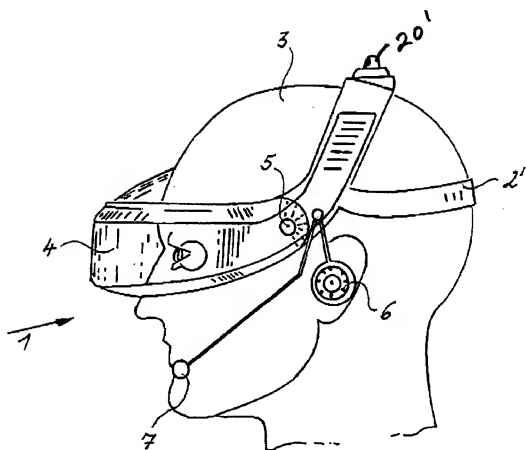


FIG. 3

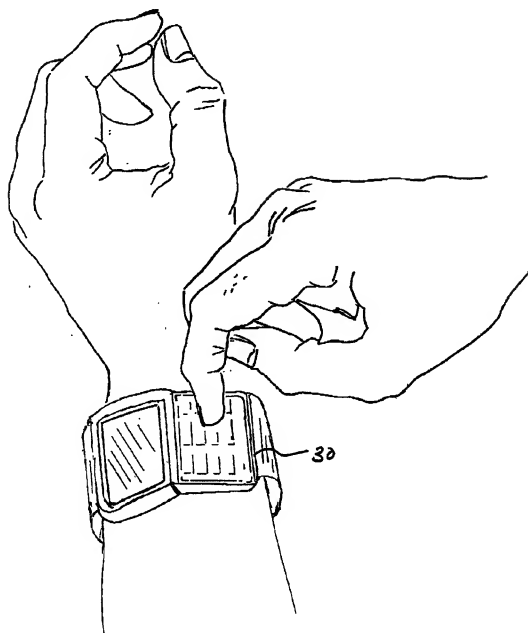


FIG. 4

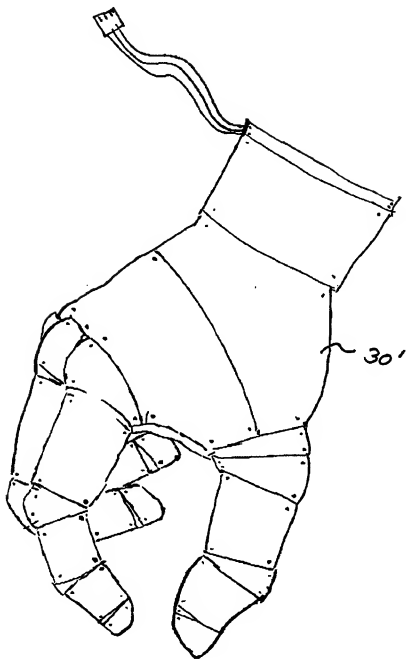


FIG. 5

PORTABLE MACHINE DISPLAY

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The invention relates to a portable machine display for operating and displaying operating values of a machine. More specifically, it relates to a terminal that is carried by the operator while moving around the machine.

[0003] 2. The Prior Art

[0004] Conventional terminals typically contain at least one monitor having a control panel. The monitor is located in a central location of a machine.

[0005] In the case of very large machines, for example 10 meters in length and more, a few monitors are often distributed over the length of the machine, so that the machine operator can always keep at least one of the monitors within his range of vision irrespective of where he is located along the machine.

[0006] Also known are portable terminals which, in addition to displaying the operating condition on a monitor, permit the machine operator to interact with the machine. A keypad is provided on the terminal for this purpose, or the monitor contains a touchscreen.

[0007] These portable terminals are marketed by KERA GmbH of Göttingen under the designation KETOP G 100, and described in greater detail in the sales prospectus.

[0008] A disadvantage of fixed terminals is that having multiple terminals is costly. In addition, it is not possible for the machine operator to constantly keep his eyes on the monitors, such as when it is necessary to do work on the machine and the operator has to keep his eyes on the work site. It is difficult in this case to directly observe the effect of a machine adjustment on the operating mode of the machine.

[0009] Portable terminals also contain considerable drawbacks. Even though these terminals do reduce the number of monitors required along the machine, the operator still requires the use of his hands for holding the terminals and consequently his hands are no longer free for doing work on the machine. If he takes the terminal out of his hands, it is not always possible for the machine operator to keep the terminal in his range of vision while working on the machine.

SUMMARY OF THE INVENTION

[0010] It is an object of the present invention to provide a portable terminal for operating and displaying the operating values of a machine. The terminal contains a controlling part and a monitor for displaying the operating values. Therefore, the portable terminal is always within the range of vision of the operator, irrespective of his position and line of sight.

[0011] These and other objects are accomplished by providing a terminal designed for attachment to the body of the operator. The display of the monitor is always within the range of vision of the operator.

[0012] To assure that the machine data shown on the display is always within the field of vision of the operator, irrespective of the position in which he is keeping his head, the display of the monitor is designed as goggles. The

goggles display both the operating values of the machine and allow simultaneous viewing of the environment.

[0013] The advantage obtained with the present invention is that the machine operator will always have both the surrounding environment and the displayed machine data in front of his eyes.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] Other objects and features of the present invention will become apparent from the following detailed description considered in connection with the accompanying drawings. It is to be understood, however, that the drawings are designed as an illustration only and not as a definition of the limits of the invention.

[0015] FIG. 1 shows a perspective side view of the portable machine display according to the invention;

[0016] FIG. 2 shows another embodiment of the portable display;

[0017] FIG. 3 shows another embodiment of the portable display;

[0018] FIG. 4 shows a control component; and

[0019] FIG. 5 shows another embodiment of the control component.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0020] Referring now in detail to the drawings, in particular FIG. 1 shows a monitor 1 in the form of goggles secured by head straps 2 and 2' to a head 3 of the machine operator. A sight part 4 covers the eyes of the operator. Monitor 1 on which the machine data is displayed, is located in sight part 4. The machine operator can simultaneously keep the environment within his field of vision. Therefore, the operator can walk along the machine without exposing himself to danger while keeping his eyes on the operation of the machine.

[0021] In a preferred embodiment, semi-transparent LCD displays are disposed in front of the eyes. These displays are small LCD screens, about the size of stamps, located in front of the eyes of the operator. The display screens show the images or information supplied, while allowing the operator to still view the environment through or behind the images or information in the field of vision. By providing a regulating device, the "degree of transparency" of the displays can be adapted within wide limits, for example the brightness of the ambient light as well as other influences.

[0022] According to a second embodiment of the display, an optical combination system is provided for obtaining the "transparency", for example a semi-mirror. The images of the display and the image of the environment are united in the system and jointly supplied to the eyes of the viewer.

[0023] According to a third embodiment, simultaneous viewing of the environment and the images shown on the display is accomplished by having the display arranged only in front of one eye, whereas free "transparency" is available for the other eye to view the surrounding environment.

[0024] Finally, in a fourth embodiment, sight component 4 of monitor 1 is slightly folded upwards about a center of

rotation 5. This permits the machine operator to view the displays by slightly looking or turning his eyes up, and to see the environment in front of him by slightly lowering the eyes.

[0025] The images are shown on the displays in color and are two-dimensional. A three-dimensional form of display is possible if requirements have to be met with respect to information density and clarity. Whereas a monochromatic display can be selected for less stringent requirements.

[0026] In addition to the visual display, monitor 1 is provided with an acoustic indicating device in the form of an earphone 6. Earphone 6 is secured to holding strap 2 and located near the ear of the user. Earphone 6 emits a warning sound in the event of any malfunction of the monitored machine. However, it is also possible to use earphone 6 for transmitting operating values of the machine in the form of speech.

[0027] In FIG. 4 control component 30 of the terminal contains a keyboard worn on the wrist like a wrist watch. Monitor 1 is controlled via the keyboard, by selecting the data to be displayed, brightness of the image, degree of transparency of the displays, etc. The machine can also be controlled by the keyboard.

[0028] In another embodiment shown in FIG. 5, control component 30' comprises a touchscreen. Because of the small size of the displays and their arrangement within a pair of goggles, the displays may not be directly accessible to the operator. In this case, a data glove can be provided. This is similar to the mouse pointer on the screen of a PC, wherein a mark is displaced with the help of the data glove by moving it with one or several fingers. A great number of symbols are visible on the display, of which each symbol stands for a defined function. The desired function is activated by touching a symbol with the mark moved by the data glove.

[0029] Finally, provision is made for speech control of the machine and monitor. This may be a pure speech control for controlling all functions. However, it is preferably employed for the conventional and slightly slower input of commands via the keyboard, and reserved to just a few, particularly important control commands such as the emergency stop command in the event of malfunction, which is then transmitted instantly by calling it out.

[0030] A microphone 7 is secured to holding strap 2 allowing for speech control. This allows the machine to pick up the spoken word of the operator without simultaneously transmitting excessive ambient noise.

[0031] The transfer of the data to be displayed from the machine to the terminal or of the control commands from the terminal to the machine is accomplished by electrical pulses transmitted via a wire connection. For this purpose, plug sockets are provided that are spaced apart from each other by a few steps. A connection cable between the machine and the terminal can be plugged into these sockets. The current for the terminal is supplied by the cable as well.

[0032] The preferred embodiment allows enhanced freedom of movement of the operator by wirelessly transmitting the data. For this purpose, FIGS. 2 and 3 show a transmitter and receiver 20 is installed on the machine and there is a corresponding receiver and transmitter on the terminal.

[0033] FIG. 3 shows a bulb 20' for transmitting and receiving IR-light signals.

[0034] For wireless data transmission between the terminal and the machine, the terminal is supplied with current by using rechargeable batteries. The batteries are combined in a pack and carried in a separate small casing on the belt of the operator. The transmitter and the receiver of the terminal are also accommodated in the small casing. If the transmitter and the receiver of the terminal are designed as high-frequency devices, the connection cable between the battery casing and the monitor can also be used as an antenna.

[0035] Accordingly, while only a few embodiments of the present invention have been shown and described, it is obvious that many changes and modifications may be made thereto without departing from the spirit and scope of the invention.

What is claimed is:

1. A portable terminal for controlling and displaying operating values of a machine to an operator, comprising:

a control component; and

a monitor for displaying the operating values being attachable to the operator such that the display of the monitor is always in view.

2. The portable terminal according to claim 1, wherein the monitor comprises goggles.

3. The portable terminal according to claim 2, wherein said goggles allow simultaneous viewing of the operating values of the machine and a surrounding environment.

4. The portable terminal according to claim 3, wherein said goggles comprise a semi-transparent display arranged in front of each eye of the operator.

5. The portable terminal according to claim 3, wherein said goggles comprise an optical combination system disposed in said goggles, said combination system receiving both the images on the display and the image of the environment within the line of sight and jointly supplying these images to the eyes of the operator.

6. The portable terminal according to claim 3, wherein said displays are arranged slightly folded upwards, such that the displays are in the field of vision when looking slightly up, and that the view of the environment is clear when the eyes are slightly lowered.

7. The portable terminal according to claim 2, wherein said goggles provide a three-dimensional image.

8. The portable terminal according to claim 3, wherein said goggles comprise two sides, wherein one side is transparent and a second side contains the display.

9. The portable terminal according to claim 1, wherein the control component comprises a keyboard securable to a wrist of the operator.

10. The portable terminal according to claim 1, wherein the control component comprises a data glove.

11. The portable terminal according to claim 1, further comprising a transmitter and a receiver for wireless transmission of data from the machine to the terminal.

12. The portable terminal according to claim 11, wherein said transmitter and said receiver comprise infrared devices.

13. The portable terminal according to claim 11, wherein said transmitter and said receiver comprise high-frequency devices.

14. The portable terminal according to claim 1, further comprising an electroacoustic converter placeable near an ear of the operator for acoustic output of the operating values of the machine and for a warning signal in the event of malfunctioning of the machine.

15. The device according to claim 14, wherein said acoustic output of the operating values of the machine is voice activated.

16. The portable terminal according to claim 1, further comprising a microphone for controlling the monitor and the machine by voice control.

* * * * *



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Basson et al.

(43) Pub. Date:

Oct. 17, 2002

(54) **PROTECTIVE HELMET AND MEANS FOR CONNECTION OF AN ACCESSORY**(30) **Foreign Application Priority Data**

May 22, 2000 (FR) 00/06869

(76) Inventors: Gilles Basson, Chatillon Sur
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Maronnas (FR)**Publication Classification**(51) Int. Cl.⁷ A42B 1/24

(52) U.S. Cl. 2/422; 2/6.2

(57) **ABSTRACT**

Protective helmet (1) including a main outer shell with a generally vertical plane of symmetry (P) on which an accessory, such as a clear or tinted visor or a support structure (8) for optronic equipment such as a night-vision device (9), can be fixed, characterized in that it includes connecting and locking means enabling the user to fix one or the other of the accessories to said helmet.

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(21) Appl. No.: 10/031,318

(22) PCT Filed: May 21, 2001

(86) PCT No.: PCT/FR01/01554

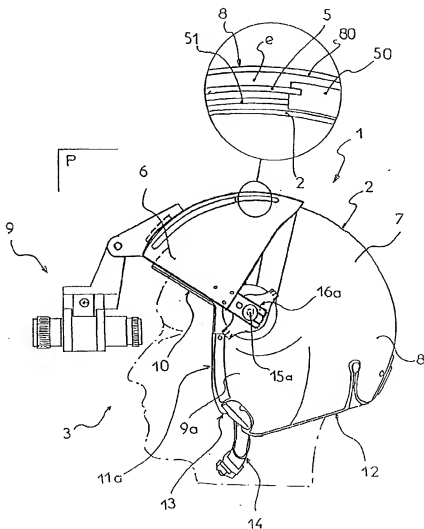


FIG 1

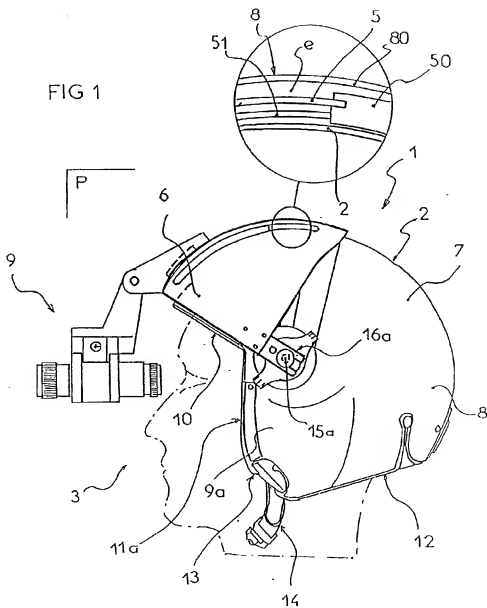


FIG 2

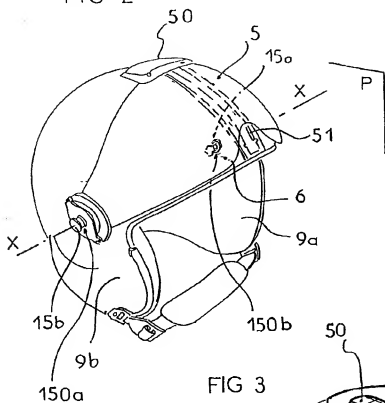


FIG 3

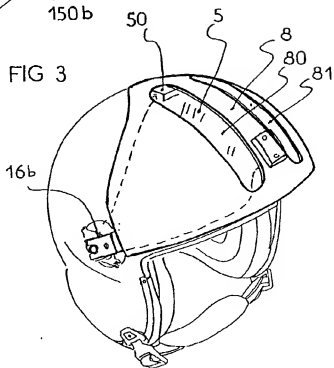


FIG 4

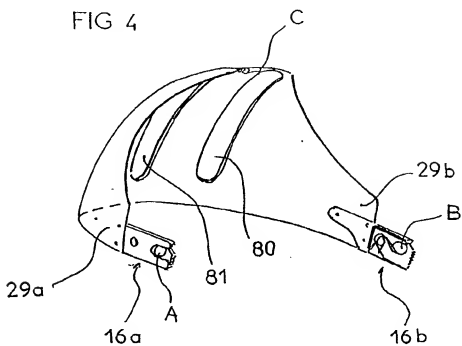


FIG 5

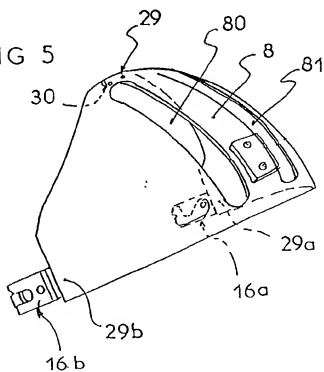


FIG 7

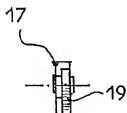


FIG 6

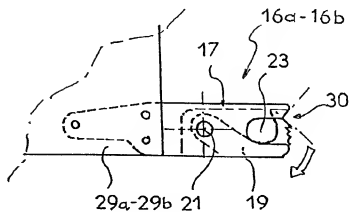
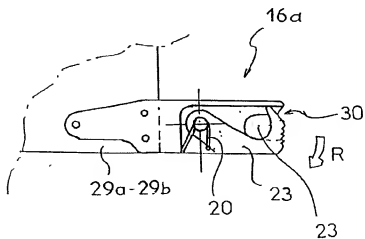
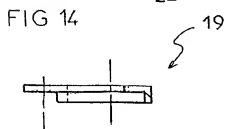
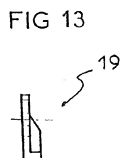
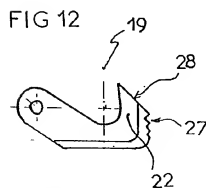
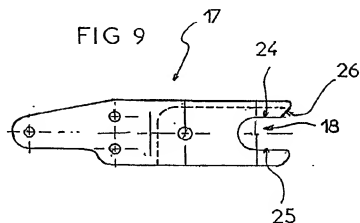
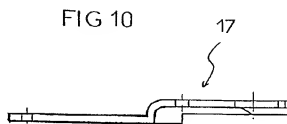
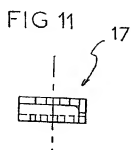
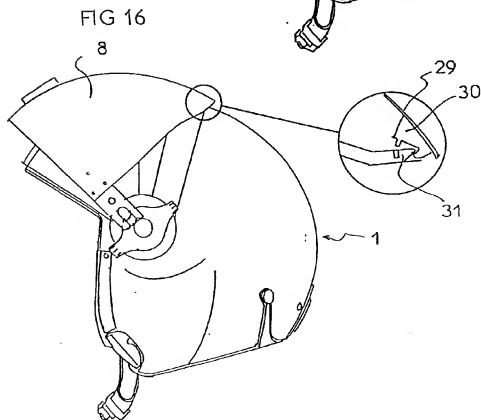
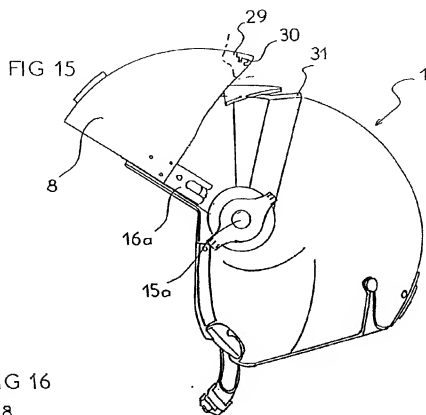
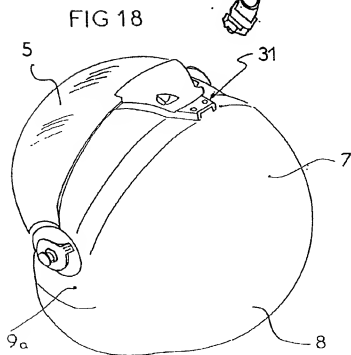
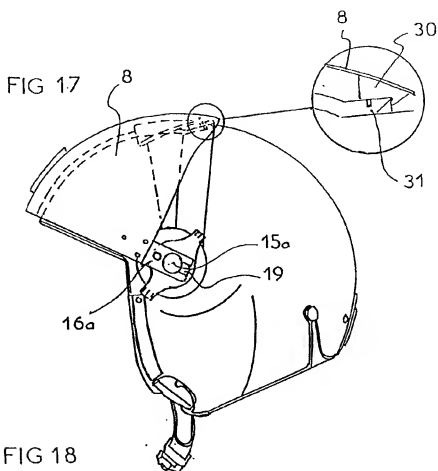


FIG 8









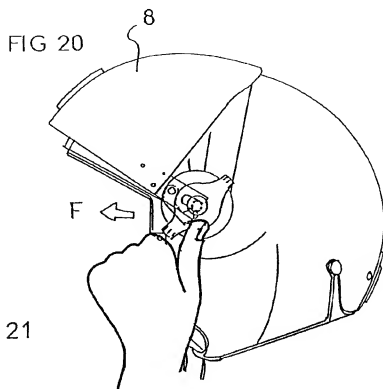
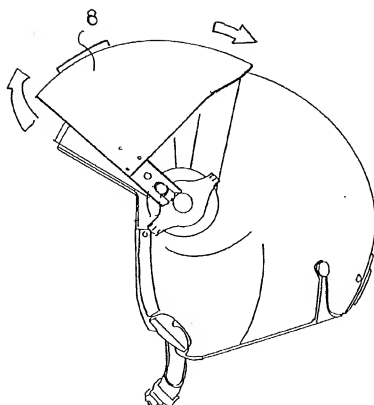
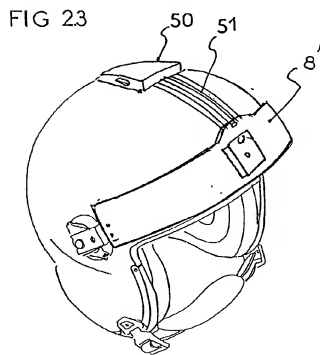
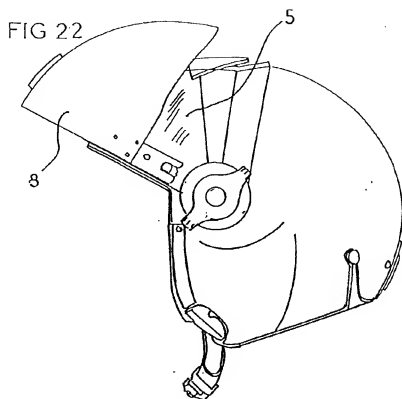
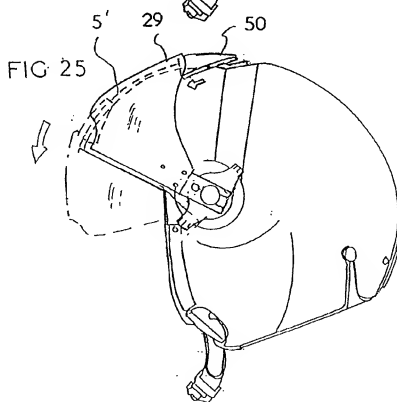
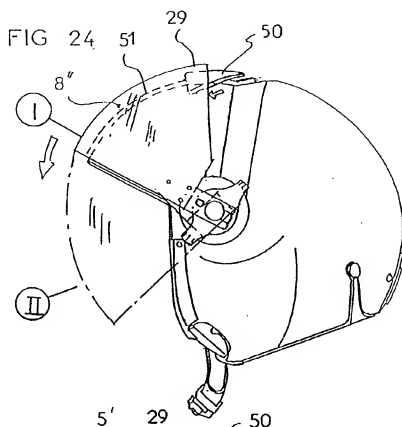


FIG 21







PROTECTIVE HELMET AND MEANS FOR CONNECTION OF AN ACCESSORY

[0001] The present invention relates to an improvement to a protective helmet, and more particularly its means for connecting an accessory such as a support, for example, for a night-vision device or the like, or even a protective screen.

[0002] Protective helmets are already known, which are used in various fields and worn by various users such as cyclists, motorcyclists, firefighters, skiers and others, such as aircraft or helicopter pilots. All of the currently available helmets, irrespective of their use, include a generally spherical rigid outer shell, having a facial opening, and whose cavity thus formed includes protective and comfort padding elements adapted to nest the user's head. Furthermore, the helmet is conventionally held on the user's head by a flexible chin strap fixed to the lateral portions of the helmet.

[0003] The present invention relates more particularly, but in a non-limiting fashion, to helmets for aircraft or helicopter pilots. Such helmets are equipped with a visualization device, such as a night-vision device. Such a device must be firmly held on the helmet and must have a precise position in relation to the user's eye. The problem of fixing it to the helmet therefore arises.

[0004] Helmets equipped with such devices are already known. For example, the one disclosed by the French Patents 2 560753 and 2 708427, U.S. Patents U.S. Pat. Nos. 5,265,276 and 4,449,787, European Patent Application EP 0 671 132. None of the patents discloses an efficient detachable mounting providing reliability and precision while being easily dismounted by the user in order to be replaced by another possible accessory.

[0005] The present invention therefore proposes particularly simple and reliable detachable means for connecting an accessory to the helmet.

[0006] Thus, the protective helmet of the invention including a main outer shell with a generally vertical plane of symmetry on which an accessory, such as a clear or tinted visor or a support structure for optronic equipment such as a night-vision device, can be fixed, is characterized in that it includes connecting and locking means enabling the user to fix one or the other of the accessories to said helmet.

[0007] According to one complementary characteristic, the connecting and locking means are arranged on both sides of the shell and are constituted by a hooking pin affixed to the shell of the helmet and a hooking and locking piece affixed to the accessory.

[0008] According to another of the characteristics, each of the pins extends outwardly on both sides of the corresponding lateral wall of the shell along a transverse axis.

[0009] According to a preferred embodiment, each of the pins is cylindrical and includes a hooking groove adapted to cooperate with the corresponding hooking piece of the support wall, whereas the hooking and locking piece is constituted by a metallic bar affixed to the accessory of the helmet and includes a pivotally movable lock biased by an elastic system such as a torsional spring.

[0010] Moreover, the bar includes a rearwardly open housing, whereas the lock is constituted by a hook-shaped metallic piece journaled on said bar about a pivoting axis,

and whereas the lock includes a rear locking projection extending upwardly to form, together with the housing of the bar, a hole that is adapted to cooperate with the corresponding hooking pin of the shell.

[0011] According to one complementary characteristic, the lock is pivotally arranged on its corresponding bar so as to be capable of pivoting downward against the action of the spring, and to be biased in upward abutment by this spring.

[0012] In a preferred embodiment of the invention, the support structure for a night-vision device is constituted by a wall made of a composite material that has substantially the shape of a triangular sphere portion, whereas it includes an ocular protective screen pivotally movable about a transverse axis in relation to the shell between two positions, i.e., between an active lowered position of use according to which it is arranged in front of the user's eyes and an inactive raised position of non-use according to which it is raised so as to be in front of the frontal wall of the shell, said screen being guided in the center of the helmet by a guiding and locking carriage moving in a central slide. According to this embodiment, the wall of the support structure is arranged at the level of the front upper wall portion of the shell, beyond and at a certain distance from the latter so as to leave a space enabling the protective screen to move with its guiding carriage, whereas said wall of the support structure includes at least one hole enabling the user to have access to the guiding carriage of the ocular protective screen in order to be able to maneuver it, even in the presence of the night-vision device.

[0013] Other characteristics and advantages of the invention will become apparent from the description that follows, with reference to the annexed drawings which are only provided by way of non-limiting examples.

[0014] FIG. 1 is a lateral view, with a partial tear, showing the helmet according to the invention with one of its accessories, in particular, its support for a night-vision device.

[0015] FIG. 2 is a perspective view of the helmet without its accessory.

[0016] FIG. 3 is a perspective view of the helmet with its support for a night-vision device, said device not being shown.

[0017] FIGS. 4 and 5 are views showing the supports for a night-vision device, with its means for connecting to the helmet.

[0018] FIG. 4 is a rear perspective view.

[0019] FIG. 5 is a front perspective view.

[0020] FIGS. 6, 7, and 8 are views showing the connecting means affixed to the accessory.

[0021] FIG. 6 is an outer lateral view.

[0022] FIG. 7 is an end view.

[0023] FIG. 8 is an inner lateral view.

[0024] FIGS. 9, 10, and 11 are views showing the connecting bar without its lock.

[0025] FIGS. 12, 13, and 14 are views showing the corresponding lock.

[0026] FIGS. 15, 16, and 17 show the various steps in fixing the support.

[0027] FIG. 18 is a rear perspective view showing how the third point for connecting the support to the helmet is obtained, FIG. 19 showing the corresponding connecting portion of said support.

[0028] FIGS. 20-22 show the various steps in releasing the support.

[0029] FIGS. 23 and 24 show two types of possible accessories that can be detachably connected to the helmet.

[0030] FIG. 23 shows an alternative support for a night-vision device.

[0031] FIG. 24 shows the helmet according to the invention with a detachable facial protective screen.

[0032] FIG. 25 shows the helmet of the invention with a detachable ocular protective screen.

[0033] The protective helmet shown in FIGS. 1-24, generally designated by the reference numeral (1) is, for example, a helmet for aircraft or helicopter pilots having a generally longitudinal plane of symmetry (P), which includes, in a known fashion, a main outer shell (2) having a front facial opening (3) with an internal padding commonly called the cap.

[0034] The main outer shell is constituted by a substantially spherical wall, with a generally vertical plane of symmetry (P), which is advantageously made of a composite material of the type including a stacking of layers of reinforcing fibers, impregnated and linked to one another by a resin matrix. The fibers can be glass, aramid, Nylon, polyethylene, or carbon fibers, whereas the matrix can be a thermosetting- or thermoplastic-type resin.

[0035] The main outer shell (2) includes a plurality of wall portions, namely, a front upper wall portion (6) extended rearwardly by a rear upper wall portion (7) itself extended downwardly by a rear lower wall portion (8), and further includes two lateral wall portions (9a, 9b). The front upper portion (6) corresponds to the zone occupied by the user's forehead and is limited by the upper edge (10) of the facial opening (3) which is limited laterally by two lateral edges (11a, 11b). The rear upper wall portion (7) corresponds to the zone occupied by the user's skull, whereas the rear lower wall portion (8) corresponds to the zone occupied by the user's nape of the neck. Moreover, the wall (5) of the cap is limited downwardly by a lower edge (12). The lateral wall portions (9a, 9b) correspond to the zones occupied by the user's ears and are limited forwardly by the corresponding lateral edge (11a, 11b) of the facial opening (3) and downwardly by the front ends of the lower edge (12). The connection between the lateral edges (11) and the lower edge occurs along an advantageously curved connecting edge (13). The helmet of the invention further includes a chin strap (14) constituted, for example, by a flexible strap.

[0036] Furthermore, the inner covering of the shell (2) is constituted by a cap made, for example, of a rigid foam covered with a comfort flexible foam layer and a fabric for the internal decoration of the helmet.

[0037] The helmet (1) according to the invention can include an ocular protective screen (5) pivotally movable about a transverse axis XX' in relation to the shell (1)

between two positions, i.e., between a lowered active position of use according to which it is positioned in front of the user's eyes and a raised inactive position of non-use according to which it is raised so as to be in front of the frontal wall of the shell. Said screen (5) is guided in the center of the helmet by a guiding and locking carriage (50) moving in a central slide (51).

[0038] The helmet (1) according to the invention is adapted to receive an accessory such as, for example, a support structure (8, 8') for a night-vision device (9) or a clear or tinted visor (8'), for example.

[0039] According to one characteristic of the invention, the helmet includes connecting and locking means adapted to detachably fix one or the other of the accessories, depending on the user's needs.

[0040] Thus, according to one characteristic of the invention, connecting and locking means are provided between the helmet and the accessory, which enable the accessory to be reliably connected to the helmet while allowing a particularly simple and voluntary detachment.

[0041] The support structure of the night-vision device (8) is constituted by a wall made of a composite material that has substantially the shape of a triangular sphere portion.

[0042] It is noted that the wall (80) of the support structure (8) is arranged at the level of the front upper wall portion (6) of the shell, beyond and at a certain distance from the latter so as to leave a space (c) enabling the protective screen (6) to move with its guiding carriage (50), as is particularly visible in FIG. 1a. Furthermore, said support wall (8) includes at least one hole and advantageously two elongated holes (80, 81) enabling the user to have access to the guiding carriage (50) of the ocular protective screen (6), in order to be able to maneuver it even in the presence of the night-vision device.

[0043] The connecting and locking means are constituted by a hooking pin (15a, 15b) affixed to the shell (2) of the helmet and a hooking and locking piece (16a, 16b) affixed to the accessory (8). Each of the pins (15a, 15b) extends outward on both sides of the corresponding lateral wall (9a, 9b) of the shell and is advantageously arranged coaxially with respect to the transverse pivoting axis XX' of the ocular protective screen (5). In addition, each of the advantageously cylindrical pins (15a, 15b) includes a hooking groove (150a, 150b) adapted to cooperate with the corresponding hooking piece of the support wall.

[0044] Said hooking and locking piece (16a, 16b) is constituted by a metallic bar (17) fixed to the support structure (8, 8'), and includes a housing (18) open rearwardly and a pivotally movable lock (19) biased by an elastic system such as a torsional spring (20).

[0045] The lock (19) is constituted by a hook-shaped metallic piece journaled on the hooking bar about a pivoting axle (21). Said lock therefore includes a rear locking projection (22) extending upwardly to form, together with the housing (18) of the bar (17), a hole (23) adapted to cooperate with the corresponding hooking pin (15a, 15b) of the shell.

[0046] It is noted that the housing (18) of the bar (17) is limited upwardly and downwardly by an upper edge (24) and a lower edge (25), the end of the upper edge (24) including a first chamfer (26). Furthermore, the rear edge

(27) of the locking projection (22) includes a second chamfer (28) adapted to form, together with the first chamfer (26) of the bar, a V (30) for engaging the hooking pin (15a, 15b) of the helmet, promoting the snap positioning of the support wall. The lock (19) is pivotally arranged on its corresponding bar so as to be capable of pivoting downward along (R) against the action of the spring, and to be biased in upward abutment by this spring.

[0047] The support of the night-vision device is such that its triangular wall carries a hooking piece (16a, 16b) at each of its lateral ends (29a, 29b), whereas its central upper end (29) includes hooking means (30) adapted to cooperate with a central upper hooking piece (31) fixed to the wall of the shell of the helmet. Thus, the support wall (8) of the night-vision device (9) is fixed to the helmet at three points (A, B, C) forming a perfect retention triangle.

[0048] FIGS. 15, 16, 17 show the procedure for fixing the support wall (8). Said procedure begins by bringing the wall support closer to the helmet (FIG. 15), then by hooking the hooking means (30) of the upper central end (29) on the upper central hooking piece (31) as shown in FIG. 16, and then by snap engaging the hooking pieces (16a, 16b) on the corresponding pins (FIG. 17).

[0049] The separation of the support (8) from the helmet (1) is carried out just as easily, as shown in FIGS. 20, 21, 22. To unlock, the user only has to press forwardly, along I, on each of the movable locks (19) with his two thumbs, as shown in FIG. 20. This causes the downward pivoting of each of the locks, on the one hand, and the forward pivoting of the support wall, and results, therefore, in its disengagement from the pins (15a, 15b).

[0050] Of course, the device carried by the support (8) can be of any type other than a night-vision device, such as an assembly of optronic means, binoculars, or the like, for example.

[0051] It is noted that the support (8) previously described and illustrated in FIGS. 1-22 is constituted by a substantially rectangular spherical wall, but it could be otherwise, as shown in FIG. 23, for example. According to this alternative, the support is constituted by a frontal band (8').

[0052] In addition, the detachable accessory can also be a clear or tinted transparent facial protective screen (8'') as shown in FIG. 24, without leaving the scope of the invention, said screen being detachable and pivotal about each of the pins (15a, 15b) so as to be movable between two positions, namely, an inactive raised position (I) and a lowered position of use (II). Said detachable facial screen is therefore connected laterally to the hooking pins and in its upper central portion (29) to the guiding carriage (50); of course, the connection to the carriage is also detachable and can be, for example, as that described previously in connection with the embodiments shown in FIGS. 15-19.

[0053] The accessory can also be a detachable ocular screen (5'), as shown in FIG. 25, the connection to the helmet being identical to that of the facial screen described in the previous paragraph.

[0054] It is understood that due to the connection interface (15a-15b, 16a-16b), it is possible for the user to detachably fix an accessory and to remove it in order to fix another.

[0055] Of course, the invention is not limited to the embodiments described and shown by way of examples, but it includes all of the technical equivalents as well as their combinations.

1. Protective helmet (1) including a main outer shell with a generally vertical plane of symmetry (P) on which an accessory, such as a clear or tinted visor (8'') or a support structure (8, 8') for optronic equipment such as a night-vision device (9), can be fixed, characterized in that it includes connecting and locking means enabling the user to fix one or the other of the accessories to said helmet.

2. Protective helmet (1) according to claim 1, characterized in that the connecting and locking means are arranged on both sides of the shell (2), and are constituted by a hooking pin (15a, 15b) affixed to the shell (2) of the helmet and a hooking and locking piece (15a, 16b) affixed to the accessory (8).

3. Protective helmet (1) according to claim 2, characterized in that each of the pins (15a, 15b) extends outwardly on both sides of the corresponding lateral wall (9a, 9b) of the shell along a transverse axis XX'.

4. Protective helmet (1) according to claim 3, characterized in that each of the pins is cylindrical and includes a hooking groove (150a, 150b) adapted to cooperate with the corresponding hooking piece of the supporting wall.

5. Protective helmet (1) according to any of claims 2-4, characterized in that said hooking and locking piece (16a, 16b) is constituted by a metallic bar (17) affixed to the accessory (8, 8', 8'') of the helmet and includes a pivotally movable lock (19) biased by an elastic system such as a torsional spring (20).

6. Protective helmet (1) according to claim 5, characterized in that the bar (17) includes a rearwardly open housing (18), whereas the lock (19) is constituted by a hook-shaped metallic piece journaled on said bar about a pivoting axis (21).

7. Protective helmet (1) according to claim 5, characterized in that the lock includes a rear locking projection (22) extending upwardly to form, together with the housing (18) of the bar (17), a hole (23) that is adapted to cooperate with the corresponding hooking pin (15a, 15b) of the shell.

8. Protective helmet (1) according to any of claims 5-7, characterized in that the lock (19) is pivotally arranged on its corresponding bar (17) so as to be capable of pivoting downward along (R) against the action of the spring, and to be biased in upward abutment by this spring.

9. Protective helmet (1) according to any of the preceding claims, characterized in that the support structure of the night-vision device (8) is constituted by a wall made of a composite material that has substantially the shape of a triangular sphere portion.

10. Protective helmet (1) according to any of the preceding claims, characterized in that it includes an ocular protective screen (5) pivotally movable about a transverse axis XX' in relation to the shell (1) between two positions, i.e., between a lowered active position of use according to which it is arranged in front of the user's eyes, and a raised inactive position of non-use according to which it is raised so as to be in front of the frontal wall of the shell, said screen (5) being guided in the center of the helmet by a guiding and locking carriage (50) moving in a central slide (51).

11. Protective helmet (1) according to claim 9, characterized in that the wall (80) of the support structure (8) is arranged at the level of the upper front wall portion (6) of the

shell, beyond and at a certain distance from the latter so as to leave a space (c) enabling the protective screen (6) to move with its guiding carriage (50), as visible more particularly in FIG. 1a.

12. Protective helmet (1) according to claim 11, characterized in that the wall (80) of the support structure (8)

includes at least one hole (80, 81) enabling the user to have access to the guiding carriage (50) of the ocular protective screen (6) in order to be able to maneuver it, even in the presence of the night-vision device.

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